REMARKS

The headings "Example 5" and "Example 7" have been amended to "Reference Example 5" and "Reference Example 5" and "Reference Example 7" respectively. This amendment has been made only for clarity. No new matter has been added. Further, since these amendments do no touch on the merits, they should be entered after final.

Claims 1-4, 6 and 8 stand rejected under 35 USC 103(a) as being unpatentable over Endo. This rejection is respectfully traversed.

Independent claim 1 claims a flame resistant fiber. Endo describes a flame retardant polyester containing phosphorous. The only portions of Endo that describe a fiber made from the polyester are Examples 10 and 11. In Example 10, Endo states that the fiber is made at a take-up speed of 600 m/min. In claim 1, applicants claim a fiber take-up speed of 1000m/min - 4500 m/min. Accordingly, the claimed fiber take-up speed is considerably greater than the fiber take-up speed disclosed in Endo.

The take up speed is related to the shear rate of the discharged polymer according to the following formula:

Shear rate= $(32Q/\pi D^3)\times(1/\rho)$

Wherein Q is the discharge rate of a single orifice pore (g/sec), D is the diameter of the orifice (cm), ρ is the density of the polymer on melting which is about 1.2 g /cm^3 for a polyester.

As described in the specification, the shear rate of the discharged polymer should be 3000-9000s^{-1} to control the molecular orientation and to avoid cutting the yarn. When the shear rate is less than 3000s^{-1}, the molecular orientation becomes insufficient in the melting state, and the obtained fiber has a lower tenacity and poor abrasion resistance (see page 17, lines 18-22). When the draw ratio is increased to try and eliminate these defects, the dying properties of the resulting fiber is degraded. (see page 17, lines 23-25). Conversely, when the shear rate exceeds 9000s^{-1}, soil on the spinneret surface, particularly around the orifice, becomes intense. This can result in cut yarn.

Endo fails to describe a fiber made using the claimed take-up speed or a corresponding shear rate.

The fiber claimed in claim 1 also satisfies the following three formulas:

$\tan \delta max \geq 0.1740$ (formula 1)

When $\tan \delta max$ is less than 0.1749, the dying property is degraded (see page 18, lines 30-33). When the draw ratio is extremely high, as in Endo, this property can not be achieved.

$T\alpha - 3.77 \times \ln (dtpf) \leq 137.0$ (formula 2)

When the temperature of the $\tan \delta max$ is outside this claimed range, the dying properties are again degraded. (See page 19, lines 7-11). Again, when the draw ratio is extremely high as in Endo, this range also can not be achieved.

$$1.331 \leq SG - \frac{\sqrt{\Delta n}}{8.64} \leq 1.345 \qquad \text{(formula 3)}$$

When this value is lower than 1.331, the molecular orientation degree relative to the degree of crystallinity becomes higher, the amorphous portion becomes dense, and the dying properties and abrasion resistance of the fiber is degraded. Conversely, when the value is higher than 1.345, the molecular orientation degree relative to the degree of crystallinity becomes too low, which in turn results in a superior dying property but lower heat stability. (See page 19, lines 15-26). When the draw ratio is high, as in Endo, this value tends to fall below this range and the dying property and abrasion resistance are degraded.

The Examiner admits that claimed take-up speed is not disclosed by Endo. However, the Examiner states that take-up speed is a "result effective variable" and it would be obvious to use the claimed take-up speed since finding an optimum value involves only routine skill in the art. The Examiner also admits that Endo fails to disclose a fiber having the characteristics described in formulas 1-3 of claim 1. Nonetheless, the Examiner summarily dismisses these claimed characteristics by stating that the claimed properties are inherent to Endo because Endo describes a polyester with a phosphorous atom in a side chain. The Examiner's contentions are incorrect. The claimed fibers provide a fiber that has superior flame resistance, dying properties, abrasion

resistance, heat stability, fine whiteness and resistance to hydrolysis. Endo fails to disclose or discuss all of these fiber properties or how one can go about optimizing all of these values.

The claimed take-up speed was found to improve fiber characteristics including abrasion resistance. The claimed take-up speed also allows for a draw ratio which improves the dying properties of the fibers. Endo does not describe a connection between abrasion resistance and take-up speed. Endo also fails to mention how dying properties can be improved. With out these teachings, which are described by applicants, there would be no motivation to "optimize" the take-up speed to achieve the range claimed by applicants.

Further, the characteristics described by formulas 1-3 in claim 1 are not properties of the polyester, rather the claimed characteristics are properties of the fiber made from the polyester. The fibers produced in Examples 10 and 11 in Endo were produced in a manner clearly different from the manner described in the specification and claimed by applicants. Accordingly, the characteristics claimed in formulas 1-3 are not inherent to these fibers.

As described in Example 10, the fibers in Endo were obtained at a take-up speed of 600 m/min and the filaments were drawn at a ratio of 4.6 on a heated plate at 90°C. When these conditions are used to produce fibers, the take-up speed is too slow, which results in a slow shear rate and produces weak fibers with degraded abrasion resistance. To eliminate these defects, Endo used a high draw ratio. As previously stated, a fiber drawn at a high draw ratio can not satisfy formulas 1-3.

The fibers disclosed in Endo are also unable to satisfy the claimed SHW of 10%. Reference Example 5 of the present application (previously Example 5) shows what happens when a high draw ratio is used. In Reference Example 5, the draw ratio was increased to 3.4 (which is still lower than the 4.6 draw ratio used by Endo) from the 2.79 draw ratio used in Example 1. As a result, the abrasion resistance decreased, which caused fluffing during weaving. In addition, SHW increased to 10.2%, which is greater than the 10% claimed in claim 1.

Further, in Reference Example 7 (Previously Example 7) of the present application, the

setting temperature was lowered to 145°C (which is still higher than the 90°C temperature used in Endo). As a result, the SHW increased to 12.3% which is greater than the 10% claimed in claim 1.

Accordingly, Endo fails to describe or suggest a flame-retardant polyester fiber that satisfies formulas 1-3, is produced with the claimed take-up speed and has a SHW of not more than 10%. For all of these reasons, the rejection of claim 1 in view of Endo should be withdrawn. The rejection of claims 2-4, 6 and 8, which depend from claim 1, should be withdrawn for at least the same reasons.

Claim 7 stand rejected under 35 USC 103(a) as being unpatentable over Endo in view of Buxbaum. This rejection is respectfully traversed.

The Examiner relies upon Buxbaum only for the suggestion to use a fluorescent brightener and the claimed catalyst. Claim 7, depends from claim 1. As described above, Endo fails to describe or suggest a flame-retardant polyester fiber that satisfies formulas 1-3, is produced with the claimed take-up speed and has a SHW of not more than 10%. Since neither Endo nor Buxbaum disclose a fiber made from a polyester with phosphorous in the side chain that satisfies these claimed characteristics, the rejection of claim 7 should be withdrawn.

Claims 9-11 stand rejected under 35 USC 103(a) as being unpatentable over Endo in view of Vogt. This rejection is respectfully traversed. The Examiner relies upon Vogt only to describe a technique for making a non-woven suede like material. Claims 9-11, depends from claim 1. As described above, Endo fails to describe or suggest a flame-retardant polyester fiber that satisfies formulas 1-3, is produced with the claimed take-up speed and has a SHW of not more than 10%. Since neither Endo nor Vogt disclose a fiber made from a polyester with phosphorous in the side chain that satisfies these claimed characteristics, the rejection of claims 9-11 should be withdrawn.

For the foregoing reason a notice of allowance is solicited.

In the event that the transmittal letter is separated from this document and the Patent and

Trademark Office determines that an extension and/or other relief is required, applicants petition for any required relief including extensions of time and authorizes the Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to **Deposit Account No. 03-1952** referencing docket no. 358362010400.

Respectfully submitted,

Dated: September 24, 2004 By: ______________________

Jonathan Bockman
Registration No. 45,640
Morrison & Foerster LLP
1650 Tysons Boulevard
Suite 300
McLean, Virginia 22102
Telephone: (703) 760-7769
Facsimile: (703) 760-7777